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MISSISSIPPI-MISSOURI.

Mississippi-Missouri. The Mississippi River (Algonkin *Missi Sipi*, 'Great River'), the largest river of North America, is, with its tributaries, wholly within the boundaries of the United States. It drains most of the territory between the Rocky and Alleghany Mountains, embracing an area of 1,257,545 sq. m., or more than two-fifths of the area of the United States. This basin includes the minor basins: Lower Mississippi, 65,646 sq. m.; Red River 92,721; Arkansas 184,742; Missouri, 527,690; Upper Mississippi, 179,635; Ohio, 207,111. Besides the four tributaries here named, there are forty-one others navigable, and 200 more of moderate size. The total length of the Mississippi is 2960 miles, of which 2161 are navigable; but the Missouri affluent (see below) is longer than the Upper Mississippi, and with the lower river gives a total of 4200 miles. The total navigable waters amount to 16,090 miles.

The source of the Mississippi is Lake Itasca in the north-west central part of Minnesota, about 7 miles long by 1 to 3 wide, which has, however, several feeders, the principal being Elk or Glazier Lake. The

remotest springs of Itasca rise in 47° 34′ N. lat. and 95° 20′ W. long., and are 1680 feet above sea-level. As it issues from this lake the Mississippi is about 12 feet wide and 18 inches deep. Through pine-forests and swamps for hundreds of miles it winds from lake to lake, with frequent rapids and picturesque falls, until, 1200 feet wide, at the city of Minneapolis it plunges over the Falls of St. Anthony. This point is the head of river-navigation, though in various reaches above small steamboats ply. After receiving the St. Croix, the Mississippi becomes the boundary between the states of Minnesota, Iowa, Missouri, Arkansas, and Louisiana on the right, and Wisconsin, Illinois, Kentucky, Tennessee, and Mississippi on the left. Its frequent rapids within Minnesota are due to the granite bed, but sandstone prevails farther down, to Rock Island, Illinois. On the Wisconsin boundary the river expands into Lake Pepin, and thereafter, fully a mile wide, flows between bluffs 200 and 300 feet high, and sometimes through dense forests. At Rock Island there are rapids with 22 feet of fall, and 125 miles farther down are the Des Moines rapids with 24 feet of fall. Around these obstructions to navigation the United States government has constructed ship-canals. The entrance of the turbid Missouri produces a marked change in the character of the river; for several miles the diverse waters refuse to mingle, the Missouri's muddy tribute taking the right bank and the Upper Mississippi's clear stream the left. When the union is complete, the whole river has henceforth a light yellowish colour, modified somewhat by the Ohio's greenish water and more by the reddish water

of the Arkansas and Red. From the mouth of the Ohio the trough of the Mississippi is about 4470 feet wide, but as it approaches the Red it is narrowed to 3000 feet, and at New Orleans is 2500 feet. The usual depth of the channel southward from the Ohio is from 75 to 100 feet, and its surface is sometimes higher than the country beyond its banks. In fact, from the Missouri to the Gulf the Mississippi rolls in serpentine course through vast alluvial tracts or 'bottoms,' whose width varies from 30 to 150 miles. Their total area, including those along tributary streams, is variously estimated from 29,790 to 41,193 sq. m. Though of unsurpassed fertility, scarcely one-tenth of these lands are cultivated owing to the dangers of the annual overflow. The melting of the ice and snow in the upper basin swells the lower current from March to June. Levees or embankments, largely built by the government, now extend for more than 1600 miles. Between the Ohio and the Red rivers extraordinary floods, rising from 47 to 51 feet, occur about once in ten years, making 'crevasses' in the levees, and doing immense damage. In these great floods the river has been known to spread over a tract of 150 miles. Below the Red River the waters are discharged through numerous 'bayous' into the Gulf of Mexico. The main channel runs south-eastward, and finally divides into five or six passes, the principal being the south, the north-east, and the south-west; the last is in 28° 58·5′ N. lat. and 89° 10′ W. long.

The mean velocity of the Lower Mississippi is 2⅓ miles per hour. The yearly discharge into the Gulf is nearly 145 cubic miles; the sedimentary matter carried

with this would form a prism 1 mile square and 263 feet high, while the amount pushed along the bottom of the channel would make another 1 mile square and 27 feet high. These vast deposits and the constant changes caused by floods tend to embarrass the entrance to the great river. To keep an open channel, at least 20 feet deep, Captain Eads (q.v.) contracted with the United States government to erect and maintain a system of jetties at the South Pass. The construction was begun in 1875, and has proved highly successful, a depth exceeding 30 feet having been maintained. The mouth of the Mississippi is essentialy tideless.

The principal cities on the great river are Minneapolis, St. Paul, La Crosse, Dubuque, Keokuk, Quincy, Hannibal, St. Louis, Memphis, and New Orleans, at several of which the river is crossed by railway bridges. The steel bridge at St. Louis is the most southern, besides which another was connected at the same city in 1890.

See Humphrey's and Abbot's *Physics and Hydraulics of the Mississippi River* (Phila. 1861), and *Commerce and Navigation of the Mississippi* (Washington, 1888).

Missouri River ('Big Muddy'), the principal branch of the Mississippi River, is formed by the confluence of the Jefferson, Gallatin, and Madison rivers, at Gallatin City, Montana, 4132 feet above the sea-level. These rivers rise in the Rocky Mountains, close to the sources of the Columbia and Colorado rivers, and to the Continental Divide. The Madison has the remotest source in a small lake of the same name in Yellowstone National Park in Wyoming, 44° 19′ N. lat. and 110° 50′ W. long., at an elevation of 7632 feet. This

river flows north-west and north to the junction of the Three Forks. The Missouri then flows northward, skirting the main range of the Rocky Mountains, and, after passing through a gorge called 'The Gate of the Mountains,' turns to the north-east and reaches Fort Benton, the head of navigation, 225 miles from Gallatin City. About 40 miles above Fort Benton are the Great Falls, where the river descends 327 feet in 15 miles by a series of cataracts, the highest having a perpendicular fall of 87 feet. From Fort Benton the course is easterly, the river being flanked by bluffs about a mile apart until it passes the rapids 400 miles below, when the valley opens to a width of 10 miles. The Milk River is its first large tributary, but at the boundary of North Dakota the still larger Yellowstone joins it. The Yellowstone also rises in the National Park, and flows at first over cataracts and through cañons until it emerges in a more level country. It is 1152 miles long, and has the general characteristics of the Missouri. From its junction, which is the head of navigation in low-water season, the Missouri flows through North Dakota, east and then south-east to Bismarck (1610 feet above sea-level), where it is crossed by the splendid bridge of the Northern Pacific Railroad. Through South Dakota the south-easterly course continues to Sioux City, whence flowing south the river becomes the boundary between Nebraska and Kansas on the right and Iowa and Missouri on the left. On receiving the tributary Kansas the stream turns to the east, and flowing across the state of Missouri pours its muddy waters into the channel of the Mississippi, 20 miles above St. Louis. The

Missouri is 3047 miles long, of which 2682 are called navigable, but owing to its tortuous, treacherous, and obstructed channel navigation is attended with great risks. The growing cities on its banks forsake the use of the river for commercial purposes and depend on the railways. In 1866 there were seventy-one steamers in active service in that part within the state of Missouri, but twenty years later the number had diminished to seven steamers and three tow-boats. The chief towns on the banks are Bismarck, Yankton, Sioux City, Omaha, Council Bluffs, Nebraska City, St Joseph, Atchison, Leavenworth, and Kansas City.

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